second paragraph, are considered moot and will not be discussed in this amendment. The Applicant believes that amended claims 25, 30, 31, 32 and 33, and newly added claims 34-46 are in proper form for allowance.

Claims 25, 30, 31 and 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 25, 30, 31, 32 and 33 have been rewritten in independent form including all of the limitations of the base claim and any intervening claims. Therefore, claims 25, 30, 31, 32 and 33 should now be in proper form for allowance.

The Applicant has presented new claims 34-46 that remove the indefiniteness from the original claims and include elements to distinguish the claims from the prior art. Nothing in the Fay reference or any other cited prior art references teach or suggest such an inventory of panel shapes being connected together as in the present invention on an architectural scale for building structures of different and unique shapes and sizes.

Attached hereto are nine (9) sheets from the Applicant describing the differences between the Fay reference and the Applicant's invention, and proposed new claims. The Applicant's proposed new claims 19-31 are the same as the proposed new claims 34-46 in this proposed amendment.

In view of the amendments and remarks presented above, the Applicant believes that the application is now in condition for allowance, and requests reconsideration of the application and allowance of the claims. The Applicant respectfully requests that the Examiner review this

proposed amendment and telephone the undersigned to discuss the proposed amendments and new claims.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

In accordance with 37 C.F.R. § 1.121(c)(1)(ii), the following is a marked-up version of the amended claims.

Claims 19-24 have been canceled.

25. (Amended) ~~The modular construction system of claim 19,~~ A modular construction system comprising:

an inventory of panel shapes that are directly related to each other by virtue of the panel shapes derivation from a common format, the format being a three-dimensional grid defined by twenty-seven subcubes within a single larger cube, the subcubes having corners that form sixty-four vertices occurring within the grid, from each of which, straight line radians are drawn to each of the other sixty-three vertices, upon repeating for all sixty-four vertices, revealing fifty-nine panel shapes that are defined within the grid format, the panel shapes forming panels having a plurality of sides;

wherein single line radians between any two vertices are axes between the vertices and are aligned with panel centerlines that are parallel and equidistant to the sides of the panels of the inventory of panel shapes being joined;

a means of constructing a structure from the inventory of panel shapes on an architectural scale that allows for a plurality of panels to be connected at a plurality of angles, with respect to each other, about a given axis parallel to the panel sides about which at least two panels are joined, or about a given vertice, where the axes between the sides of the panels being joined

intersect, the plurality of panels including structural, load bearing struts attached along the panel sides which can converge on the given vertice and in any direction;

wherein the strut provides a panel shape framework forming the perimeter of the panel to carry the weight of the panel and allow connection to other panels, and

wherein the struts are offset from the axis between the two vertices and are joined to a common tubular element by means of webs and brackets that are attached to the struts for joining at least two panels together.

Claims 26-29 have been canceled.

30. (Amended) ~~The modular construction system of claim 29,~~ A modular construction system comprising:

an inventory of panel shapes derived from a three-dimensional grid defined by twenty-seven subcubes within a single larger cube, the panel shapes forming a plurality of panels having a plurality of sides thereto;

a means for connecting a plurality of panels together at any angle through 360 degrees about any axis between vertices and at any dihedral angle with respect to each other for building architectural structures;

wherein the plurality of panels include struts attached along the sides of each of the panels forming the perimeter of the panels and panel shape framework to carry the weight of the panels and allow connection to other panels;

wherein the means for connecting the plurality of panels together includes at least one joinery assembly;

further comprising a first joinery assembly that includes at least one web attached to the struts of at least two panels, at least one collar having an opening extending therethrough and at least one tab extension extending from one side of the collar that attaches to the at least one web with fasteners, and a tubular element that extends through the opening in the at least one collar for connecting a plurality of panels together; and

further comprising a first joinery assembly that includes at least one web attached to the struts of at least two panels, at least one collar having an opening extending therethrough and at least one tab extension extending from one side of the collar that attaches to the at least one web with fasteners, and a tubular element that extends through the opening in the at least one collar for connecting a plurality of panels together.

31. (Amended) ~~The modular construction system of claim 30,~~ A modular construction system comprising:

an inventory of panel shapes derived from a three-dimensional grid defined by twenty-seven subcubes within a single larger cube, the panel shapes forming a plurality of panels having a plurality of sides thereto;

a means for connecting a plurality of panels together at any angle through 360 degrees about any axis between vertices and at any dihedral angle with respect to each other for building architectural structures;

wherein the plurality of panels include struts attached along the sides of each of the panels forming the perimeter of the panels and panel shape framework to carry the weight of the panels and allow connection to other panels;

wherein the means for connecting the plurality of panels together includes at least one joinery assembly;

further comprising a first joinery assembly that includes at least one web attached to the struts of at least two panels, at least one collar having an opening extending therethrough and at least one tab extension extending from one side of the collar that attaches to the at least one web with fasteners, and a tubular element that extends through the opening in the at least one collar for connecting a plurality of panels together; and

wherein the first joinery assembly further includes joint closures for covering the space between the struts and bracing elements for securing the panels in place.

32. (Amended) ~~The modular construction system of claim 29,~~ A modular construction system comprising:

an inventory of panel shapes derived from a three-dimensional grid defined by twenty-seven subcubes within a single larger cube, the panel shapes forming a plurality of panels having a plurality of sides thereto;

a means for connecting a plurality of panels together at any angle through 360 degrees about any axis between vertices and at any dihedral angle with respect to each other for building architectural structures;

wherein the plurality of panels include struts attached along the sides of each of the panels forming the perimeter of the panels and panel shape framework to carry the weight of the panels and allow connection to other panels;

wherein the means for connecting the plurality of panels together includes at least one joinery assembly;

further comprising a first joinery assembly that includes at least one web attached to the struts of at least two panels, at least one collar having an opening extending therethrough and at least one tab extension extending from one side of the collar that attaches to the at least one web with fasteners, and a tubular element that extends through the opening in the at least one collar for connecting a plurality of panels together; and

further comprising a second joinery assembly that includes at least one bracket attached to the struts of at least two panels, the at least one bracket having an opening extending therethrough, and a tubular element that extends through the opening in the at least one bracket for connecting a plurality of panels together.

33. (Amended) ~~The modular construction system of claim 32,~~ A modular construction system comprising:

an inventory of panel shapes derived from a three-dimensional grid defined by twenty-seven subcubes within a single larger cube, the panel shapes forming a plurality of panels having a plurality of sides thereto;

a means for connecting a plurality of panels together at any angle through 360 degrees about any axis between vertices and at any dihedral angle with respect to each other for building architectural structures;

wherein the plurality of panels include struts attached along the sides of each of the panels forming the perimeter of the panels and panel shape framework to carry the weight of the panels and allow connection to other panels;

wherein the means for connecting the plurality of panels together includes at least one joinery assembly;

further comprising a first joinery assembly that includes at least one web attached to the struts of at least two panels, at least one collar having an opening extending therethrough and at least one tab extension extending from one side of the collar that attaches to the at least one web with fasteners, and a tubular element that extends through the opening in the at least one collar for connecting a plurality of panels together;

wherein the first joinery assembly further includes joint closures for covering the space between the struts and bracing elements for securing the panels in place;

further comprising a second joinery assembly that includes at least one bracket attached to the struts of at least two panels, the at least one bracket having an opening extending therethrough, and a tubular element that extends through the opening in the at least one bracket for connecting a plurality of panels together; and

wherein the second joinery assembly further includes joint closures for covering the space between the struts and bracing elements for securing the panels in place.

Claims 34-46 have been added as follows:

34. A modular construction system comprising:

an inventory of panel shapes that are directly related to each other by virtue of their derivation from a common format, which format reveals 59 panel shapes, which shapes form panels having three and four sides, the majority of which three-sided panels, called triangles, are asymmetrical, with sides of unequal length, and which the majority of four-sided panels, parallelograms, have parallel sides that are of incrementally variable lengths and width and which panel shapes vary in thickness up to and including intended, required thickness for architectural applications as walls;

wherein the panel shapes of this common format are defined by single line radians, called axes, that are aligned with the centerlines of the panels to which they are parallel and equidistant; and

the intersections of which radians constitute vertices which define the centermost point between and equidistant from the corners of panels being joined, and

a means of constructing a structure from the inventory of panel shapes on an architectural building scale that allows for a plurality of panels to be connected at a plurality of dihedral angles with respect to each other about a given axis parallel to the panel sides about which two or more panels are joined, or

about a given vertice, where the axes of panels being joined intersect, the plurality of panels including structural, load bearing struts along the panel sides which can converge on a given vertice from any direction and direction combinations; and

wherein the strut provides a panel shape framework forming the perimeter of the panel to carry the weight of the panel and allow connection to other panels.

35. The modular construction system of claim 34 which inventory of panel shapes may be combined so as to form 108 simple polygons, the majority of which are asymmetrical, with various edges of unequal lengths producing sides of varying sizes and shapes.

36. The modular construction system of claim 34, wherein the struts are offset from, parallel to, and rotational about any given axis between vertices, providing for varying numbers of struts that may occur simultaneously along any given axis between vertices, and positioned in a plurality of angles and dihedral angle combinations with respect to each other.

37. The modular construction system of claim 34, further comprising at least two connection mechanisms capable of joining more than two panels in multiple combinations about any given axis or vertice, which connection mechanisms consist of several independent components, including a centerline element, bridge elements, brace elements, anchorage elements and joint closure elements, which together serve to facilitate the plurality of joinery options between panel side struts.

38. The modular construction system of claim 37, wherein the connection mechanisms include the centerline element which consists of tubular segments that are centered exactly on the centerline of the axis between any two given vertices, which in turn, is centered exactly on the longitudinal centerline of two or more panels, to which the tubular elements are linked, and which by virtue of the tubular design provide for the passage of wires, cables and similar utilities, unimpeded, throughout a building structure or construction composition.

39. The modular construction system of claim 37, wherein the plurality of panels include struts attached along the sides of each of the panels, forming the perimeter of the panels and panel framework, to carry the weight of the panels and allow for connection to other panels.

40. The modular construction system of claim 37, wherein comprising two connection mechanisms distinguished by two bridges elements, webs and brackets, which serve to bridge between and link the tubular centerline element to the struts defining the sides of panels, and through which common centerline element the webs and brackets effect the joinery between a plurality of panels about a common axis.

41. The modular construction system of claim 40, wherein comprising two connection mechanisms which bridge elements, webs and brackets, serve to establish and maintain a clear opening, a measurable distance, between the tubular centerline element and panel strut sides and in turn between the sides of a plurality of panels being joined about a common axis, which distance, times the thickness of panels, produces a cavity throughout the joint assembly between panels being joined, useful for the insertion of various utility lines throughout a given structure.

42. The modular construction system of claim 37, wherein the bridge element of the first of two connection mechanisms, the web, is attached to the tubular centerline element by means of at least one independent anchorage element, the collar, an open ended cylinder with at least one tab extension, which forms a sleeve around the tubular centerline element and which tab extension is attached by conventional means to the web which, being a fixed extension of the strut, makes the linkage between the strut and the tubular centerline element, thus effecting the connection of a plurality of panels being joined, at the corner condition, about the vertice common to the plurality of panels being joined.

43. The modular construction system of claim 42, wherein the first joinery assembly includes joint closures for covering the space between the struts so as to provide a finish and additional bracing to the joint assembly between a plurality of panels at the corner condition about a common vertice.

44. The modular construction system of claim 37, wherein the second bridge element of the two connection mechanisms consists of brackets, at least one of which occurs along the struts defining panel sides to which they are anchored with conventional fasteners and along which, being adjustable, they may be repositioned so that by virtue of a circular opening in the

bracket, permits a single tubular centerline element to pass through a plurality of brackets, of at least one stemming from each strut-panel side, of a plurality of panels being joined about a given axis, which upon anchoring the brackets to each other by conventional means completes the linkage of a plurality of panels to each other about their common axis in addition to fixing, rendering unchangeable, the plurality of dihedral angles between the panels so joined about a given axis.

45. The modular construction system of claim 44, wherein the second joinery assembly further includes joint closures for covering the space between the struts so as to provide a finish and additional bracing to the joint assembly between a plurality of panels along panel sides about a common axis.

46. The modular construction system of claim 34, wherein, by virtue of struts being offset form the axis between the two vertices and joined to a common tubular centerline element by means of webs and brackets, provides for at least two panels to anchor to, and alternate with, typical strut-node space frame systems and conventional construction materials and methods.

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APPLICANT'S RESPONSE

I, the Applicant, have reviewed Examiners objections to the proposed invention based on Fay. Applicant had no knowledge of Fay until receipt of the Office Action in response to the third Continuation in Part from the Examiner. Regardless, it would not have mattered, as nothing of relevance to the invention, as proposed by Applicant, could have been found. Indeed, it was to overcome the inadequacies of such systems that the Fractionalized Cube system was developed.

Applicant acknowledges and realizes that it is the obligation of the Patent Office to force the Applicant to thoroughly think through, flesh out and clarify distinctions between the proposed invention and prior art. It is toward this end that the following is submitted, to underscore numerous fundamental differences between the Fay model and the Fractionalized Cube Modular Construction System as proposed by Applicant.

1. **Fay:** Employs only three (3) panel shapes; accounting for large and small versions still becomes only six (6) total.

   Applicant: System employs 59 panel shapes; initial, as others have been revealed post application submission.
   In addition to Fay, hundreds of patents consist of squares, triangles and rectangles; I would think that what distinguishes them is the uniqueness of their application.

2. **Fay:** Panels are completely **symmetrical**, except for one rectangle, all sides are of equal length.

   Applicant: Practically all of the triangular panels are **asymmetrical**, sides of unequal length. This

fact, plus the many variations in length of rectangles, would make the application of the Fay, knuckle-pin, system impossible.

3. **Fay:** Joinery system permits **only two** panels to be joined about any given **single** axis. Four panels require 2 axes, six requires 3 axes, etc. Additionally, panels have to be doubled up back to back, which is wasteful, redundant, and neither feasible nor applicable to the space-forming system proposed by Applicant, Fig. 11.

Applicant: Joinery system could have 20 panels about any given **single** axis - Fig. 11C, about which single axis 5 panels are shown.

4. **Fay:** With this inventory, only six (6) simple polygons can be formed; accounting for two sizes for some, still adds up to only 10, all of which are completely **symmetrical** about 2 & 3 axes.

Applicant: Based on inventory Fig. 2A-E, as many as 108 simple polygons are possible - Figs. 3, 4, 5, and 6, in which 61 are shown, most of which are **asymmetrical**, with edges of unequal and varying lengths and sides of unequal and varying sizes and shapes.

5. **Fay:** Joinery about any given **single** vertice is limited to only 5 axes that may converge at said vertice about which whose related panel components (struts) can be joined - Fig. 10.

Applicant: The Fractionalized Cube hub system is conceived so that any given **single** vertice may receive many

more than 5 panel components about axes converging from 292 different angles (based on existing inventory), and in almost unlimited combinations thereof; schematically illustrated in Fig. 9.
This concept objective is not anticipated by Fay.

6 . **Fay:** The axis is offset from the centerline of the panel, note Fig. 4.

Applicant: The axis is positioned exactly on the centerline of the panel; essential for application of the invention as intended, Fig. 11C.

7. **Fay:** Knuckles are attached, (extension of), the plate side, which even if interpreted as a strut makes it a single entity, a contiguous solid unit - Figs. 1-9. There is no intervening space, i.e., measurable distance, between the knuckles and plate (panel side / strut).

Applicant: There is a required space, a measurable distance, between the tubular centerline element and panel side strut; Figs. 10, 14, 22, 23.
Fay Figs. 1-9 bear absolutely no resemblance to Applicant Figs. 10, 14, 22 & 23.

8. **Applicant:** As conceived, the Fractionalized Cube concept makes specific provision for joining to and alternating with typical strut-node space frame systems as well as conventional construction materials, Figs. 20 & 21.

Fay: This assembly is an entity unto itself which does not foresee, infer or envision anchorage to any other construction system. Certainly it could be imagined as possible, but in reality does not imply such an association.

9. **Fay:** Utilizes one simple joinery system, essentially that of a door hinge; align the knuckles and drop in a pin and the joint is effected. The fact that one knuckle is shifted slightly with respect to the others does not, in the opinion of Applicant, constitute a second joinery system.

The knuckles and plate are integral and manufactured as a single unit, the joining of which pairs involve a single operation, the insertion of a pin.

Applicant: System requires two distinct sets of components - one, a fixed web with collars at corner conditions, and two, adjustable brackets with bolts employed along strut (panel) sides. Fay's fixed knuckles, Ref. No. 11, bear no resemblance to Applicant's adjustable bracket, Ref. No. 72, Figs. 15, 16 & 23.

10. **Fay:** This model was developed to be workable on a small scale and for limited application. As shown, the panels (plates) are perhaps 1/8" thick. For architectural application it would have to be increased to 4" to 6" thick, requiring very large knuckles and pins which would not be practical. That the panels may be as thick as the knuckles may be true but has no bearing on the invention as proposed by Applicant. It simply does not follow that one could derive, or even consider, an architectural application based on Fay.

Applicant: Construction system proposed by Applicant was developed expressly for architectural applications.

11. **Fay:** The connection pin (centerline element) is a solid element as conceived and illustrated.

Applicant: The centerline element is deliberately made hollow for more reasons than just providing a linkage; primarily to accommodate the passage of wiring and cables, etc. On an enlarged scale the Fay pin could be so converted, but such is not even remotely inferred from this patent as shown.

It is very hard for myself, the Applicant, to imagine how a toy utilizing only three simple, symmetrical panel shapes and a modified door hinge patented in 1936 anticipates a system with the capabilities illustrated in Figs. 7A-7E, Figs. 24A & B, Figs. 25, 26, & 27 in 2002. Applicant has reviewed many other space forming systems, many of which are more sophisticated than Fay; however, absolutely none met the parameters, criteria, or objectives established by Applicant upon embarking on the development of a modular construction system. Indeed, it was the intent of Applicant to come up with a system that overcame the limitations and shortcomings of these systems, which the Fractionalized Cube Modular Construction System does in fact achieve.

IN THE CLAIMS

19. A modular construction system comprising:
an inventory of panel shapes that are directly related to each other by virtue of their derivation from a common format, which reveals 59 panel shapes, which shapes form panels having three and four sides, the majority of which three-sided panels, called triangles, are asymmetrical, with sides of unequal length, and which the majority of four-sided panels, parallelograms, have parallel sides that are of incrementally variable lengths and width and which panel shapes vary in thickness up to and including intended, required thickness for architectural applications as walls;

wherein the panel shapes of this common format are defined by single line radians, called axes, that are aligned with the centerlines of the panels to which they are parallel and equidistant; and

the intersections of which radians constitute vertices which define the centermost point between and equidistant from the corners of panels being joined, and

a means of constructing a structure from the inventory of panel shapes on an architectural building scale that allows for a plurality of panels to be connected at a plurality of dihedral angles with respect to each other about a given axis parallel to the panel sides about which two or more panels are joined, or

about a given vertice, where the axes of panels being joined intersect, the plurality of panels including structural, load bearing struts along the panel sides which can converge on a given vertice from any direction and direction combinations; and

wherein the strut provides a panel shape framework forming the perimeter of the panel to carry the weight of the panel and allow connection to other panels.

20. The modular construction system of Claim 19 which inventory of panel shapes may be combined so as to form 108 simple polygons, the majority of which are asymmetrical, with various

edges of unequal lengths producing sides of varying sizes and shapes.

21. The modular construction system of Claim 19, wherein the struts are offset from, parallel to, and rotational about any given axis between vertices, providing for varying numbers of struts that may occur simultaneously along any given axis between vertices, and positioned in a plurality of angles and dihedral angle combinations with respect to each other.

22. The modular construction system of Claim 19, further comprising at least two connection mechanisms capable of joining more than two panels in multiple combinations about any given axis or vertice, which connection mechanisms consist of several independent components, including a centerline element, bridge elements, brace elements, anchorage elements and joint closure elements, which together serve to facilitate the plurality of joinery options between panel side struts.

23. The modular construction system of Claim 22, wherein the connection mechanisms include the centerline element which consists of tubular segments that are centered exactly on the centerline of the axis between any two given vertices, which in turn, is centered exactly on the longitudinal centerline of two or more panels, to which the tubular elements are linked, and which by virtue of the tubular design provide for the passage of wires, cables and similar utilities, unimpeded, throughout a building structure or construction composition.

24. The modular construction system of Claim 22, wherein the plurality of panels include struts attached along the sides of each of the panels, forming the perimeter of the panels and panel framework, to carry the weight of the panels and allow for connection to other panels.

25. The modular construction system of Claim 22, wherein comprising two connection mechanisms distinguished by two bridge elements, webs and brackets, which serve to bridge between and link the tubular centerline element to the struts defining the sides of panels, and through which common centerline element the webs and brackets effect the joinery between a plurality of panels about a common axis.

two bridge elements webs & bracket

26. The modular construction system of Claim 25, wherein comprising two connection mechanisms which bridge elements, webs and brackets, serve to establish and maintain a clear opening, a measurable distance, between the tubular centerline element and panel strut sides and in turn between the sides of a plurality of panels being joined about a common axis, which distance times the thickness of panels, produces a cavity throughout the joint assembly between panels being joined, useful for the insertion of various utility lines throughout a given structure.

space/cavit between & elements & struts & panel sid

27. The modular construction system of Claim 22, wherein the bridge element of the first of two connection mechanisms, the web, is attached to the tubular centerline element by means of at least one independent anchorage element, the collar, an open ended cylinder with at least one tab extension, which forms a sleeve around the tubular centerline element and which tab extension is attached by conventional means to the web which, being a fixed extension of the strut, makes the linkage between the strut and the tubular centerline element, thus effecting the connection of a plurality of panels being joined, at the corner condition, about the vertice common to the plurality of panels being joined.

1st connection mechanism the web. Joinery at Vertice condition

28. The modular construction system of Claim 27, wherein the first joinery assembly includes joint closures for covering the space between the struts so as to provide a finish and additional bracing to the joint assembly between a plurality of panels at the corner condition about a common vertice.

Joint closure @ Vertice condit

29. The modular system of Claim 22, wherein the second bridge element of the two connection mechanisms consists of brackets, at least one of which occurs along the struts defining panel sides to which they are anchored with conventional fasteners and along which, being adjustable, they may be repositioned so that by virtue of a circular opening in the bracket, permits a single tubular centerline element to pass through a plurality of brackets, of at least one stemming from each strut-panel side, of a plurality of panels being joined about a given axis, which upon anchoring the brackets to each other by conventional means completes the linkage of a plurality of panels to each other about their common axis in addition to fixing, rendering unchangeable, the plurality of dihedral angles between the panels so joined about a given axis.

2nd connection mechanism The bracket joinery about the axis condition

30. The modular construction system of Claim 29, wherein the second joinery assembly further includes joint closures for covering the space between the struts so as to provide a finish and additional bracing to the joint assembly between a plurality of panels along panel sides about a common axis.

Joint closure at axis condition

31. The modular construction system of Claim 19, wherein, by virtue of struts being offset form the axis between the two vertices and joined to a common tubular centerline element by means of webs and brackets, provides for at least two panels to anchor to, and alternate with, typical strut-node space frame systems and conventional construction materials and methods.

provision for joinery to space frames and conventional construction